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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/049,188

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EXAMINER

CANTELMO, GREGG

ART UNIT

PAPER NUMBER

1795

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/049,188	<b>Applicant(s)</b> YOSHIDA ET AL.	
	<b>Examiner</b> Gregg Cantelmo	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 19 May 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1, 17-22 and 27-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 17-22 and 27-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response to Amendment***

1. In response to the amendment received May 19, 2008:
  - a. Claims 1, 17-22 and 27-30 are pending. No amendment to the claims has been submitted with the response above.
  - b. The prior art rejections stand.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 17, 18, 21, 22, and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 07-230811A (JP '811).

This rejection relies upon the IPDL machine translation of JP 07-230811, a copy of which has been made of record.

JP '811 discloses a membrane electrode assembly, a fuel cell having the membrane electrode assembly and method of making both.

As to the fuel cell of claim 1 and the membrane electrode assembly of claims 17, 21 and 22, JP '811 discloses electrodes each having a catalyst layer and a gas diffusion layer (abstract and paragraphs 7-13). Each of the catalyst/gas diffusion configurations are applied to a solid polymer electrolyte mold or membrane (paragraph 18). Given the full disclosure of JP '811 one of ordinary skill in the art would have

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understood the invention of this prior art reference to result a fuel cell structure having the solid polymer electrolyte mold sandwiched by opposing electrodes wherein each electrode includes the gas diffusion layer and catalyst layer as described in JP '811 and with the catalyst layers interposed between the gas diffusion layers and the electrolyte mold. The gas diffusion layers of JP '811 include polytetrafluoroethylene resin (e.g. a water repellant resin as described in the abstract and in paragraphs 2 and 7-12) and graphite whiskers (abstract and paragraphs 7-12). The graphite whiskers have a length of 30-60 micrometers (paragraphs 13 and 20) which falls within the claimed length and has a fiber filament diameter of 0.3-0.6 micrometers or 300-600 nanometers. The lower limit of 300 nanometers is a specific data point that is identical to the end point of the instant claims and since the specific data points are identical, are anticipatory for this limit. The gas diffusion layer is in intimate contact with the catalyst layer formed thereon as would have been readily understood by one of ordinary skill in the art. The mixture of the PTFE to carbon whiskers is from 5-40% by weight, preferably 10-30% by weight (see paragraph 10) such weight relationships inherently fall in the broadly claimed range of 1-95% mass as required in claim 22).

Regarding the heat treatment of at least 2000°C:

It appears that the heat treatment of the instant application fabricates a graphite structure (see page 21, lines 2-10 of the instant application). While the prior art reference does not impart this same heat treatment process step, the fibrous carbon of JP '811 is clearly described as being graphitic (as discussed above). Thus the prior art

product is held to be the same as that of the instant claims, absent clear evidence to the contrary.

“[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted).

“The Patent Office bears a lesser burden of proof in making out a case of prima facie obviousness for product-by-process claims because of their peculiar nature” than when a product is claimed in the conventional fashion. In re Fessmann, 489 F.2d 742, 744, 180 USPQ 324, 326 (CCPA 1974). Once the Examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). Ex parte Gray, 10 USPQ2d 1922 (Bd. Pat. App. & Inter. 1989). See MPEP section 2113.

The catalyst material is a mixture of platinum group catalyst and a carbon black support (see paragraph 12). Thus the surface of the gas diffusion layer in contact with the platinum catalyst material is also in contact with the carbon black support (as applied to claims 18 and 21).

The hydrophobic resin is PTFE, a fluorine-based resin (as discussed above and applied to claim 27).

### ***Response to Arguments***

3. Applicant's arguments filed May 19, 2008 have been fully considered but they are not persuasive.

Applicant argues that JP '811 does not anticipate the range of claims 1, 17, 21 and 22 and cites *Atofina v. Great Lakes* (Fed. Circ. 2006) to support their position.

However the Examiner is not persuaded by the arguments.

The fact pattern in the instant application and that of the *Atofina v. Great Lakes* are not exactly identical.

Notably the prior art teaching of JP '811 specifically teaches an end point of 300nm which is identical to one limit of the instant claims. Thus one of ordinary skill in the art would have appreciated the use and application of a fiber filament diameter of 300nm and for that particular end point, would have anticipated the claimed invention.

Thus for that particular embodiment, anticipation cannot be ignored and must be readily understood as a prior art example which clearly envisions the lower limit of the instant application.

Furthermore, and most notably, there is no evidence of criticality or unexpected results associated with the preferred claimed range of the instant application. And in the absence of such fails to provide patentable subject matter corresponding to the claimed diameter range.

Thus the rejection stands.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1, 17, 18, 21, 22, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '811.

In the alternative, as applied to the claimed range of 100-300nm and the prior art disclosed range of 300-600nm. While 300nm is anticipatory of the claimed range, the differences between the two claimed ranges is overall held to be slight differences which are obvious over one another as will be explained at the end of this alternative rejection.

This rejection relies upon the IPDL machine translation of JP 07-230811, a copy of which has been made of record.

JP '811 discloses a membrane electrode assembly, a fuel cell having the membrane electrode assembly and method of making both.

As to the fuel cell of claim 1 and the membrane electrode assembly of claims 17 and 21, JP '811 discloses electrodes each having a catalyst layer and a gas diffusion layer (abstract and paragraphs 7-13). Each of the catalyst/gas diffusion configurations are applied to a solid polymer electrolyte mold or membrane (paragraph 18). Given the full disclosure of JP '811 one of ordinary skill in the art would have understood the invention of this prior art reference to result a fuel cell structure having the solid polymer electrolyte mold sandwiched by opposing electrodes wherein each electrode includes the gas diffusion layer and catalyst layer as described in JP '811 and with the catalyst layers interposed between the gas diffusion layers and the electrolyte mold. The gas diffusion layers of JP '811 include polytetrafluoroethylene resin (e.g. a water repellant resin as described in the abstract and in paragraphs 2 and 7-12) and graphite whiskers (abstract and paragraphs 7-12). The graphite whiskers have a length of 30-60



micrometers (paragraphs 13 and 20) which falls within the claimed length and has a fiber filament diameter of 0.3-0.6 micrometers or 300-600 nanometers.

Regarding the heat treatment of at least 2000°C:

It appears that the heat treatment of the instant application fabricates a graphite structure (see page 21, lines 2-10 of the instant application). While the prior art reference does not impart this same heat treatment process step, the fibrous carbon of JP '811 is clearly described as being graphitic (as discussed above). Thus the prior art product is held to be the same as that of the instant claims, absent clear evidence to the contrary.

"[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted).

"The Patent Office bears a lesser burden of proof in making out a case of prima facie obviousness for product-by-process claims because of their peculiar nature" than when a product is claimed in the conventional fashion. In re Fessmann, 489 F.2d 742, 744, 180 USPQ 324, 326 (CCPA 1974). Once the Examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed

product and the prior art product. In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). Ex parte Gray, 10 USPQ2d 1922 (Bd. Pat. App. & Inter. 1989). See MPEP section 2113.

The catalyst material is a mixture of platinum group catalyst and a carbon black support (see paragraph 12). Thus the surface of the gas diffusion layer in contact with the platinum catalyst material is also in contact with the carbon black support (as applied to claims 18 and 21).

The difference between the claims and JP '811 is the scope of the claimed diameter range (100nm-300nm in the claims compared to 300nm-600nm in JP 811).

A review of the full disclosure of the instant application reveals that acceptable diameters are from 500nm or less (see page 19, ll. 11-22). Thus there is no apparent critical or patentable distinction for the claimed diameter range of 100-300 from diameter values as compared to diameters of up to 500nm. With this understanding, the prior art teachings in JP '811 exhibit a significant overlap with the overall recognized acceptable fiber diameters and there is no evidence of critical and unexpected results associated with the particular claimed range compared to values up to about 500nm.

Therefore the prior art teaching of fiber diameters from 300-600nm are held to be slightly different from the claimed range of 100-300nm but appreciated as acceptable diameters. Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160

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USPQ 809 (CCPA 1969). It has been held that when the difference between a claimed invention and the prior art is the range or value of a particular variable, then a prima facie rejection is properly established when the difference in the range or value is minor. Titanium Metals Corp. of Am. v. Banner, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985).

5. Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over each JP '811 rejection above as applied to claims 17 and 18 above, and further in view of U.S. patent No. 5,861,222 (Fischer).

The difference not yet discussed is of the spaces arrangements of claims 19-20.

Fischer discloses of a gas diffusion layer comprising a bimodal pore distribution and wherein the total porosity of more than 40% to less than 75% is composed of small pores with an average diameter of up to 0.5 microns and large pores with an average diameter of 1 to 20 microns.

The motivation for providing the porosity of Fischer to the gas diffusion layer of EP '638 is that it enhances the diffusive characteristics of the gas diffusion layer while maintaining adequate mechanical strength to the layer.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '811 by providing the porosity of Fischer to the gas diffusion layer of JP '811 since it would have enhanced the diffusive characteristics of the gas diffusion layer while maintained adequate mechanical strength to the layer.

6. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP '811 in view of the admitted prior art relied upon in the instant application, notably Fig. 1.

This rejection relies upon the IPDL machine translation of JP 07-230811, a copy of which has been made of record.

JP '811 discloses a membrane electrode assembly, a fuel cell having the membrane electrode assembly and method of making both.

As to the fuel cell of claim 29, JP '811 discloses electrodes each having a catalyst layer and a gas diffusion layer (abstract and paragraphs 7-13). Each of the catalyst/gas diffusion configurations are applied to a solid polymer electrolyte mold or membrane (paragraph 18). Given the full disclosure of JP '811 one of ordinary skill in the art would have understood the invention of this prior art reference to result a fuel cell structure having the solid polymer electrolyte mold sandwiched by opposing electrodes wherein each electrode includes the gas diffusion layer and catalyst layer as described in JP '811 and with the catalyst layers interposed between the gas diffusion layers and the electrolyte mold. The gas diffusion layers of JP '811 include polytetrafluoroethylene resin (e.g. a water repellant resin as described in the abstract and in paragraphs 2 and 7-12) and graphite whiskers (abstract and paragraphs 7-12).

Regarding the heat treatment of at least 2000°C:

It appears that the heat treatment of the instant application fabricates a graphite structure (see page 21, lines 2-10 of the instant application). While the prior art reference does not impart this same heat treatment process step, the fibrous carbon of JP '811 is clearly described as being graphitic (as discussed above). Thus the prior art

product is held to be the same as that of the instant claims, absent clear evidence to the contrary.

“[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted).

“The Patent Office bears a lesser burden of proof in making out a case of prima facie obviousness for product-by-process claims because of their peculiar nature” than when a product is claimed in the conventional fashion. In re Fessmann, 489 F.2d 742, 744, 180 USPQ 324, 326 (CCPA 1974). Once the Examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). Ex parte Gray, 10 USPQ2d 1922 (Bd. Pat. App. & Inter. 1989). See MPEP section 2113.

Regarding the diameter of the carbon fibers:

The graphite whiskers have a length of 30-60 micrometers (paragraphs 13 and 20) which falls within the claimed length and has a fiber filament diameter of 0.3-0.6

micrometers or 300-600 nanometers. The lower limit of 300 nanometers is a specific data point that is identical to the end point of the instant claims and since the specific data points are identical, and thus clearly obviate the claimed range. The gas diffusion layer is in intimate contact with the catalyst layer formed thereon as would have been readily understood by one of ordinary skill in the art.

In the alternative, as applied to the claimed range of 100-300nm and the prior art disclosed range of 300-600nm. While 300nm is anticipatory of the claimed range, the difference between the two claimed ranges is overall held to be slight differences which are obvious over one another.

A review of the full disclosure of the instant application reveals that acceptable diameters are from 500nm or less (see page 19, ll. 11-22). Thus there is no apparent critical or patentable distinction for the claimed diameter range of 100-300 from diameter values as compared to diameters of up to 500nm. With this understanding, the prior art teachings in JP '811 exhibit a significant overlap with the overall recognized acceptable fiber diameters and there is no evidence of critical and unexpected results associated with the particular claimed range compared to values up to about 500nm.

Therefore the prior art teaching of fiber diameters from 300-600nm are held to be slightly different from the claimed range of 100-300nm but appreciated as acceptable diameters. Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160

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USPQ 809 (CCPA 1969). It has been held that when the difference between a claimed invention and the prior art is the range or value of a particular variable, then a prima facie rejection is properly established when the difference in the range or value is minor. Titanium Metals Corp. of Am. v. Banner, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985).

The difference between the claimed invention and JP '811 is that JP '811 does not appear to clearly disclose of providing separators to sandwich the assembly (claim 29).

Admitted prior art Fig. 1 shows a typical fuel cell configuration wherein a solid electrolyte 4 is surrounded on each side by a catalyst layer, gas diffusion layer and separator plates each set of layers sandwiching the interior layers such that the separator plates 1 sandwich the electrode/electrolyte/electrode layers within (as applied to claim 29).

One of ordinary skill in the art would have found it obvious to employ the separator plates of Admitted prior art Fig. 1 to the fuel cell of JP '811 since it would have provided both the means to flow reactant to the gas diffusion layers in an isolated fashion and form a single cell unit.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '811 by employing the separator plates of Admitted prior art Fig. 1 since it would have provided both the means to flow reactant to the gas diffusion layers in an isolated fashion and form a single cell unit.

7. Claims 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '811 in view of U.S. Patent No 6,329,092 (Maeda).

This rejection relies upon the IPDL machine translation of JP 07-230811, a copy of which has been made of record.

JP '811 discloses a membrane electrode assembly, a fuel cell having the membrane electrode assembly and method of making both.

As to the fuel cell of claims 29-30, JP '811 discloses electrodes each having a catalyst layer and a gas diffusion layer (abstract and paragraphs 7-13). Each of the catalyst/gas diffusion configurations are applied to a solid polymer electrolyte mold or membrane (paragraph 18). Given the full disclosure of JP '811 one of ordinary skill in the art would have understood the invention of this prior art reference to result a fuel cell structure having the solid polymer electrolyte mold sandwiched by opposing electrodes wherein each electrode includes the gas diffusion layer and catalyst layer as described in JP '811 and with the catalyst layers interposed between the gas diffusion layers and the electrolyte mold. The gas diffusion layers of JP '811 include polytetrafluoroethylene resin (e.g. a water repellant resin as described in the abstract and in paragraphs 2 and 7-12) and graphite whiskers (abstract and paragraphs 7-12). The graphite whiskers have a length of 30-60 micrometers (paragraphs 13 and 20) which falls within the claimed length and has a fiber filament diameter of 0.3-0.6 micrometers or 300-600 nanometers. The lower limit of 300 nanometers is a specific data point that is identical to the end point of the instant claims and since the specific data points are identical, are anticipatory for this limit. The gas diffusion layer is in intimate contact with the catalyst



layer formed thereon as would have been readily understood by one of ordinary skill in the art.

Regarding the heat treatment of at least 2000°C:

It appears that the heat treatment of the instant application fabricates a graphite structure (see page 21, lines 2-10 of the instant application). While the prior art reference does not impart this same heat treatment process step, the fibrous carbon of JP '811 is clearly described as being graphitic (as discussed above). Thus the prior art product is held to be the same as that of the instant claims, absent clear evidence to the contrary.

"[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted).

"The Patent Office bears a lesser burden of proof in making out a case of prima facie obviousness for product-by-process claims because of their peculiar nature" than when a product is claimed in the conventional fashion. In re Fessmann, 489 F.2d 742, 744, 180 USPQ 324, 326 (CCPA 1974). Once the Examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed

product and the prior art product. In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). Ex parte Gray, 10 USPQ2d 1922 (Bd. Pat. App. & Inter. 1989). See MPEP section 2113.

Regarding the diameter of the carbon fibers:

The graphite whiskers have a length of 30-60 micrometers (paragraphs 13 and 20) which falls within the claimed length and has a fiber filament diameter of 0.3-0.6 micrometers or 300-600 nanometers. The lower limit of 300 nanometers is a specific data point that is identical to the end point of the instant claims and since the specific data points are identical, and thus clearly obviate the claimed range. The gas diffusion layer is in intimate contact with the catalyst layer formed thereon as would have been readily understood by one of ordinary skill in the art.

In the alternative, as applied to the claimed range of 100-300nm and the prior art disclosed range of 300-600nm. While 300nm is anticipatory of the claimed range, the difference between the two claimed ranges is overall held to be slight differences which are obvious over one another.

A review of the full disclosure of the instant application reveals that acceptable diameters are from 500nm or less (see page 19, ll. 11-22). Thus there is no apparent critical or patentable distinction for the claimed diameter range of 100-300 from diameter values as compared to diameters of up to 500nm. With this understanding, the prior art teachings in JP '811 exhibit a significant overlap with the overall recognized acceptable fiber diameters and there is no evidence of critical and unexpected results associated with the particular claimed range compared to values up to about 500nm.

Therefore the prior art teaching of fiber diameters from 300-600nm are held to be slightly different from the claimed range of 100-300nm but appreciated as acceptable diameters. Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). It has been held that when the difference between a claimed invention and the prior art is the range or value of a particular variable, then a prima facie rejection is properly established when the difference in the range or value is minor. Titanium Metals Corp. of Am. v. Banner, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985).

The differences between the claimed invention and JP '811 is that JP '811 does not appear to clearly disclose of providing separators to sandwich the assembly (claim 29) and further apparently fails to teach of a fuel battery comprising at least two fuel cells layered together (claim 30).

Fig. 1 of Maeda shows a typical fuel cell configuration wherein a solid electrolyte is surrounded on each side by a catalyst layer, gas diffusion layer and separator plates 8/9 each set of layers sandwiching the interior layers such that the separator plates 8/9 sandwich the electrode/electrolyte/electrode layers within (as applied to claim 29).

One of ordinary skill in the art would have found it obvious to employ the separator plates of Maeda to the fuel cell of JP '811 since it would have provided both

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the means to flow reactant to the gas diffusion layers in an isolated fashion and form a single cell unit.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '811 by employing the separator plates of Maeda since it would have provided both the means to flow reactant to the gas diffusion layers in an isolated fashion and form a single cell unit.

Each individual cell is then employed in a cell stack as shown in Fig. 2. Such stacks are known in the art so as to provide a power source of a desired voltage.

The motivation for stacking at least two cells on top of one another, as shown by Maeda is that it increases the voltage of the stack particular to the load requirement of the system connected to the fuel cell. Thus stacking cells obviously increases the voltage output of the fuel cell power source.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '811 by stacking at least two cells on top of one another, as shown by Maeda, since it would have increased the voltage of the stack particular to the load requirement of the system connected to the fuel cell. Thus stacking cells would have obviously increased the voltage output of the fuel cell power source.

8. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 07-296818 (JP '818) in view of JP '811.

This rejection relies upon the IPDL machine translations of JP 07-296818 and JP 07-230811, copies of which has been made of record.

JP '818 discloses a method of producing a layer assembly for a fuel cell comprising applying a first layer 1 onto a porous conductive substrate wherein the first layer comprises PTFE and conductive particles (abstract, figures and paragraphs 3 and 8-10) and forming a second layer comprising catalyst bearing carbon particles (abstract, figures and paragraphs 14 and 15). According to JP '818 the first layer includes both a conductive particle as well as a microfilament such as a graphite whisker or carbon fiber (paragraph 8). Thus the first layer of JP '818 includes embodiments that have PTFE, conductive particles and graphite whiskers or carbon fibers (as applied to claim 28).

The differences between claim 28 and JP '818 are that JP '818 does not teach of the particulars of the claimed fibrous carbon.

JP '811 teaches of using graphite nanofibers as a conductive material in a gas diffusion layer as discussed above, incorporated herein.

The motivation for using the graphite fibers of JP '811 as a specific conductive material in a gas diffusion layer or coating applied to a gas diffusion substrate is that it provides a gas diffusion layer having improved gas flow properties, mechanical properties and favorable conductive performance.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '818 by using the graphite fibers of JP '811 as a specific conductive material in a gas diffusion layer or coating applied to a gas diffusion substrate since it would have provided a gas diffusion

layer having improved gas flow properties, mechanical properties and favorable conductive performance.

Regarding the heat treatment of at least 2000°C:

It appears that the heat treatment of the instant application fabricates a graphite structure (see page 21, lines 2-10 of the instant application). While the prior art references do not impart this same heat treatment process step, the fibrous carbon of JP '818 can be graphite and more particular the conductive material of JP '811 is clearly described as being graphitic (as discussed above). Thus the prior art product is held to be the same as that of the instant claims, absent clear evidence to the contrary.

"[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted).

"The Patent Office bears a lesser burden of proof in making out a case of prima facie obviousness for product-by-process claims because of their peculiar nature" than when a product is claimed in the conventional fashion. In re Fessmann, 489 F.2d 742, 744, 180 USPQ 324, 326 (CCPA 1974). Once the Examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed

product and the prior art product. In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). Ex parte Gray, 10 USPQ2d 1922 (Bd. Pat. App. & Inter. 1989). See MPEP section 2113.

Regarding the diameter of the carbon fibers:

The graphite whiskers have a length of 30-60 micrometers (paragraphs 13 and 20) which falls within the claimed length and has a fiber filament diameter of 0.3-0.6 micrometers or 300-600 nanometers. The lower limit of 300 nanometers is a specific data point that is identical to the end point of the instant claims and since the specific data points are identical, clearly obviates the claimed range. The gas diffusion layer is in intimate contact with the catalyst layer formed thereon as would have been readily understood by one of ordinary skill in the art.

In the alternative, as applied to the claimed range of 100-300nm and the prior art disclosed range of 300-600nm. While 300nm is anticipatory of the claimed range, the difference between the two claimed ranges is overall held to be slight differences which are obvious over one another.

A review of the full disclosure of the instant application reveals that acceptable diameters are from 500nm or less (see page 19, ll. 11-22). Thus there is no apparent critical or patentable distinction for the claimed diameter range of 100-300 from diameter values as compared to diameters of up to 500nm. With this understanding, the prior art teachings in JP '811 exhibit a significant overlap with the overall recognized acceptable fiber diameters and there is no evidence of critical and unexpected results associated with the particular claimed range compared to values up to about 500nm.

Therefore the prior art teaching of fiber diameters from 300-600nm are held to be slightly different from the claimed range of 100-300nm but appreciated as acceptable diameters. Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). It has been held that when the difference between a claimed invention and the prior art is the range or value of a particular variable, then a prima facie rejection is properly established when the difference in the range or value is minor. Titanium Metals Corp. of Am. v. Banner, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985).

### ***Response to Arguments***

9. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

As set forth above: the prior art teaching of fiber diameters from 300-600nm are held to be slightly different from the claimed range of 100-300nm but appreciated as



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acceptable diameters. Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). It has been held that when the difference between a claimed invention and the prior art is the range or value of a particular variable, then a prima facie rejection is properly established when the difference in the range or value is minor. Titanium Metals Corp. of Am. v. Banner, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985).

There is no evidence of criticality between the claimed range of 300-600nm and the prior art range of 100-300nm. The Examiner is not relying on the disclosure of the instant application to show equivalence but rather to show a lack of criticality to the claimed fiber diameters. As such the claiming of such range is not held to be critical and variances in the fiber diameters outside the range of JP '811 would have been obvious and the differences in such are not held to support patentable subject matter as has been established by at least those case law cited above. Additionally a *prima facie* case of obviousness typically exists when the ranges of a claimed composition overlap the ranges disclosed in the prior art. *E.g.*, In re Peterson, 315 F.3d 1325, 65 USPQ2d 1379 (Fed. Cir. 2003); In re Geisler, 116 F.3d 1465, 1469, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997); In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936-37 (CCPA 1976); In re Malagari, 499 F.2d 1297, 1303, 182 USPQ 549, 553 (CCPA 1974).

Thus there is ample case law to support the position of a prima facie case of obviousness over the range of the prior art of JP '811 and that of the claimed range of the instant application. Thus this argument is not persuasive and the prior art rejection stands.

Of note: the arguments to Masuko have been considered but are moot since the rejection is no longer presented.

### ***Conclusion***

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is 571-272-1283. The examiner can normally be reached on Monday to Thursday, 8:30-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Gregg Cantelmo/  
Primary Examiner, Art Unit 1795